

MOMENTUM

SPRING 2024

A GRAND REVITALIZATION



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Mueller

CHAMPIONING WOMEN IN THE ARTS



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The Great Hall is among Washington, D.C.'s most elegant spaces for special events.

The 1980s transformation of a D.C. landmark into the National Museum of Women in the Arts is among the capital city's most acclaimed architectural success stories. Today, the revitalization of the distinctive building after another four decades of use adds a compelling new chapter to its remarkable history—and highlights the museum's meticulous stewardship as its administrators look to the future.

A storied home in northwest Washington, D.C., for secret Masonic rites, to which women were not permitted...a gaudy theater that specialized in kung fu movies...an overlooked and deteriorating structure in a run-down urban neighborhood.

Fortunately, in the early 1980s, Wilhelmina and Wallace Holladay recognized that the building located at 1250 New York Avenue was also something else: a historic architectural gem. Designed by renowned architect **Waddy Butler Wood of Wood, Donn & Deming**, the wedge-shaped building occupies a prime city location just three blocks from the White House. It opened in 1908 as an ornate Masonic Temple, but by the early 1940s, the first floor had been converted into a movie theater, with the rest of the building largely vacant.

The Holladays purchased the building in 1983 and set about creating a home for the museum they envisioned—one that would display their groundbreaking collection of international works by women artists. The six-story, Classical Revival-style structure was originally constructed with space for Masonic

rites on the upper floors, offices on the middle floors, and an auditorium on the ground floor. Renovating and creatively adapting the historic building as a museum and event space would require a design team with experience in both preservation and complex restorations and knowledge of the carefully controlled environments required to protect museum collections.

“A Prestigious, Challenging Job”

The Holladays turned to the architecture firm of **Keyes, Condon and Florance** (later acquired by SmithGroup), museum design specialist **David Scott**, and Mueller Associates to complete the ambitious renovation. The National Museum of Women in the Arts (NMWA) opened to international acclaim in 1987, a stunning example of sensitive historic preservation and adaptive reuse.

On the first floor, a majestic hall was created to host major events, with floors and a grand staircase constructed of marble imported from Turkish quarries. Galleries were placed on the second and third floors, with a library and research center on the fourth floor.

The fifth floor was redesigned to accommodate an auditorium, while offices were located on the fifth and sixth floors.

“It was a prestigious, challenging job—we were engineering all new systems within a landmark historic building,” **Gene Nerf, PE**, former president and CEO of Mueller, says of the 1980s renovation. “The systems had to maintain precise temperature and humidity control, and they also had to be very quiet.”

The roof would have been the ideal location for the two air-handling units, but it proved unsuitable due to inadequate framing. With reframing costs estimated to be too costly, Mueller’s engineers located the units in the building’s basement, along with the central plant equipment.

The project required extensive field work and coordination. “We had to work carefully to locate and conceal the ductwork and piping,” Nerf adds. “There were a lot of open areas and historic architectural details, as well as the expansive gallery spaces that had to be protected.”

Nerf led Mueller’s mechanical, electrical, and plumbing engineering team on the project, working with **Robert Marino, PE, LEED AP**, who had recently joined the firm as a young Penn State graduate. Marino, who would also serve as president and CEO of Mueller, found the opportunity to help design the museum’s building systems an early milestone in his career. “It was an odd-shaped building that had never had any central systems before,” he notes. “The field surveys were vital to understanding how the distribution systems could be integrated into the historic structure, and helped address the strategic placement of the air handling units.”

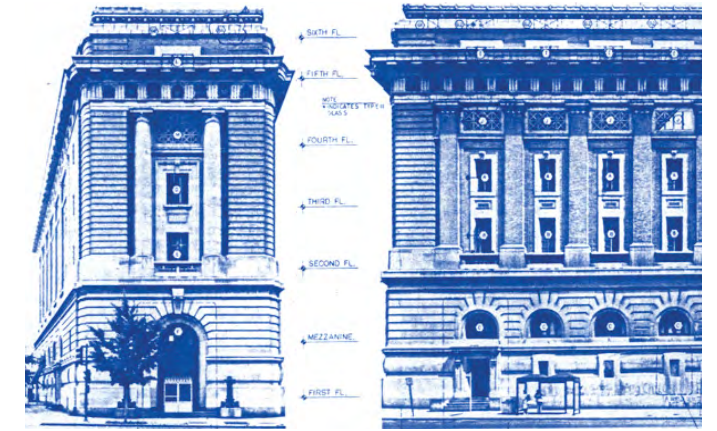
“We were focused on engineering systems that would optimize climate control, efficiency, and maintainability in an era that predated LEED® design strategies,” Marino adds. “Several temperature-control zones were required to satisfy the varying uses and occupancies of the building. We created museum-quality HVAC systems for the galleries and a separate system for the auditorium and public areas.”

Marino points to another interesting aspect of the project, given its origin as a building designed for men. “There were no women’s restrooms throughout most of the building. Obviously, it was important to address that during the 1980s renovation.”

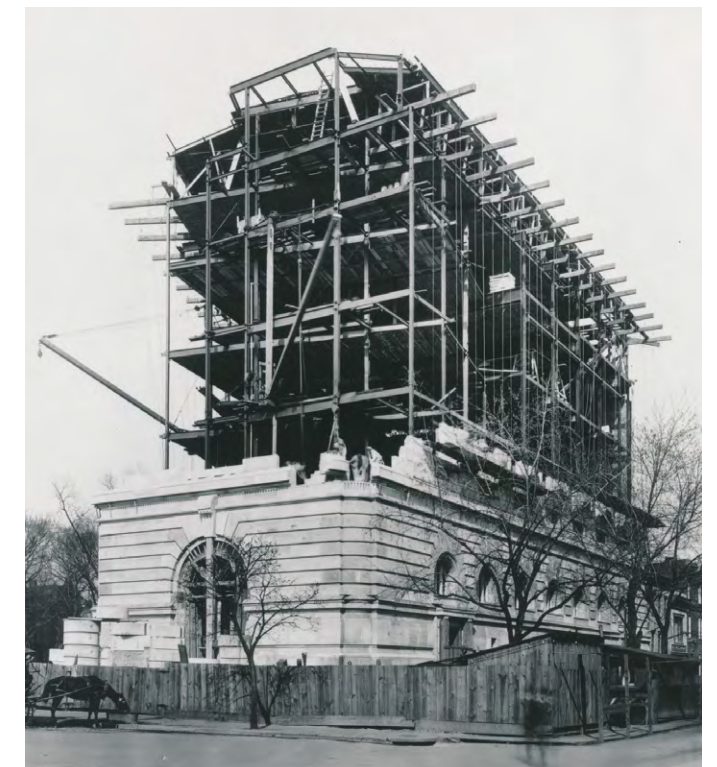
Marino recalls one moment when Mueller’s design work was put to the test early on. “As construction neared completion, an acoustician was on site, running tests in the Great Hall. This space, with mostly hard, sound-reflective surfaces, was an acoustical challenge. He asked that the HVAC system be turned on so he could gauge the amount of sound and reverberation. We informed him that the system was already running—it was that quiet. He was quite impressed. Gene and I were very proud of that.”

Planning for Long-Term Stewardship

From the beginning, NMWA administrators diligently maintained the 96,000-square-foot building and its building systems equipment, recognizing the importance of protecting valuable collections. However, after nearly 30 years, the HVAC systems were close to the end of their useful life, and the building automation system had become outdated. The exterior envelope and roof had aged, with air and moisture infiltration causing concerns. Electrical, structural, lighting, fire protection, and security systems also needed updating.



Originally designed as a Masonic Temple, the NMWA building opened in 1908 and was added to the National Register of Historic Places in 1984.



Photograph of construction of NMWA building. Courtesy of the Columbia Historical Society.

In 2015, NMWA selected **Sandra Vicchio & Associates (SVA)** to lead the development of a Facilities Preservation Plan (FPP), along with exterior envelope specialists **CVM Professional** and Mueller for mechanical/electrical engineering. The process included a meticulous assessment of existing conditions, developing a digital model, creating draft conceptual plans, and preparing estimates and an implementation schedule.

SVA explored an interior reconfiguration to create more gallery, educational, and collections storage space, while Mueller recommended modernizing the HVAC and electrical systems to maintain a sustainable, museum-quality environment. Completed in 2016, the FPP addressed functionality, safeguarding collections, energy use, and enhancing visitor experiences while providing a guide for long-term stewardship.

The recent renovation of the National Museum of Women in the Arts reconfigured and expanded gallery spaces for the museum's collection, which includes more than 6,000 paintings, sculptures, and other works of art.

- 1 The refurbished fifth-floor performance hall seats more than 180 patrons. The renovation features all new finishes, a new ceiling, and new theater systems.
- 2 The revitalization addressed staff and support space, optimizing flexibility and efficiency. Visitors are welcome to explore the library.
- 3 Enhancing public spaces and accessibility, the museum's Rotunda underscores where artistry and empowerment converge.



Unobtrusive linear openings for return air are positioned along the base of the interior gallery walls to preserve large expanses for the display of art.

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"The museum recognized that after nearly three decades, it was necessary to address sustainability and the ongoing protection of its collections," says **Sandra Vicchio, AIA, NCARB, LEED AP**, principal-in-charge of the planning and design process. "The needs of the museum had also evolved. The FPP helped create the scope for the renovation and defined priorities and opportunities early. It also served as a springboard for the museum's fundraising campaign.

"The FPP gave us the big picture, and allowed us to consider the concerns and opportunities from several perspectives including the galleries, the envelope, and the systems," says Mueller President and CEO **Todd Garing, PE, LEED AP BD+C**. "We were able to explore the 'what ifs' and consider carefully strategies to optimize energy conservation and climate control."

A Transformative Renovation

"The FPP not only defined what we needed to do in terms of the renovation, it explored critical aspects that would have an impact on long-term stewardship," Vicchio adds. "Stewardship for an art museum addresses two major components: the building and the collections. Both have significant value. We were able to examine in detail the building envelope, systems, and architecture collectively to optimize the protection of the collections."

With the FPP providing a clear framework for the work needed to bring its building up to date, NMWA turned again to the SVA and Mueller team to begin the renovation design. For this important phase, **Marshall Craft Associates (MCA)** also joined the team as architect of record. The project, which was completed in late 2023, encompassed fortifying the exterior envelope, installing new building systems, reconfiguring office and support areas,

"We've created an experience for visitors more in the manner of a grand art museum. The galleries have a very quiet feel to them, enabling visitors to engage more effectively with the art. The reconfiguration of the gallery spaces allows visitors to see what's ahead, and to visualize their journey as they navigate the exhibitions."

—Sandra Vicchio
Sandra Vicchio & Associates

"I really appreciated our initial meetings with the museum administrators and the design consultants. It presented an opportunity to discuss big ideas and bring all of our experience and knowledge to help shape the project before getting into the many details of a major renovation."

—Todd Garing
Mueller Associates



Reconfigured spaces throughout the building will enable the museum to expand its educational and outreach programs, and better protect and display collections. Rendering © Sandra Vicchio & Associates, LLC with Marshall Craft Associates.

enhancing public spaces, and improving accessibility. A creative reconfiguration within the building's existing footprint added approximately 4,500 square feet of gallery and programming space, including a new Learning Commons.

To handle the museum's diverse heating and cooling load profile, the new mechanical systems include a standalone chilled water plant supporting cooling and dehumidification and a separate heating water boiler plant. A state-of-the-art direct digital control (DDC) energy management and automatic temperature control system serves the HVAC equipment.

Rebecca Fischer, PE, LEED AP BD+C, associate and project manager for Mueller, elaborates on the mechanical system design: "The current requirements for energy conservation are much more stringent than they were in the 1980s, at the time of the original renovation," she notes. "To reduce energy use, we added total energy recovery wheels in our new air-handling units and a dedicated heat recovery chiller to provide simultaneous heating and cooling. We also designed a robust adiabatic humidification system to provide the required gallery humidity levels."

"Energy use is much more front and center now for museums than in the 1980s," adds Garing. "Protecting collections requires an energy-intensive approach, but today's technology enables us to strike a climate-appropriate and conservation-minded balance. We've learned to follow Mother Nature a little more closely. We're careful about variations in temperature and humidity, but we understand that we can save energy by permitting suitable fluctuations that follow the four seasons."

Enhancing the Display of Art

Fischer notes that the recent renovation presented another round of challenges in routing ductwork as new structural and lighting elements were installed to better serve exhibitions. "While we were able to use the same shafts as in the 1980s renovation to route ductwork and piping vertically," she says, "there are new elements above the ceiling that we needed to work around in our ductwork layout. For example, a structural grid was added to support the suspension of heavier artwork. This grid extends throughout the galleries to provide flexibility where heavier artwork is displayed, but it limited where we could run the ductwork."

"There are also supports for new lighting fixtures and a lighting track that we needed to coordinate with," Fischer adds. "Several lengths of lighting track were added to the galleries to provide flexibility in where lighting was placed."

"One of the really big wins in this project was the redesign of the galleries," says Vicchio. "It's challenging to put big ducts in a historic building, and we couldn't reduce the ceiling height—we needed large, clean vertical spaces for artwork display. We considered carefully the distribution of the systems and created a chase between the masonry and the interior walls to run the ductwork. The building's geometry is complicated. We had to reorganize all of the interior gallery walls. We used them to conceal the columns to create clear vistas toward the art."

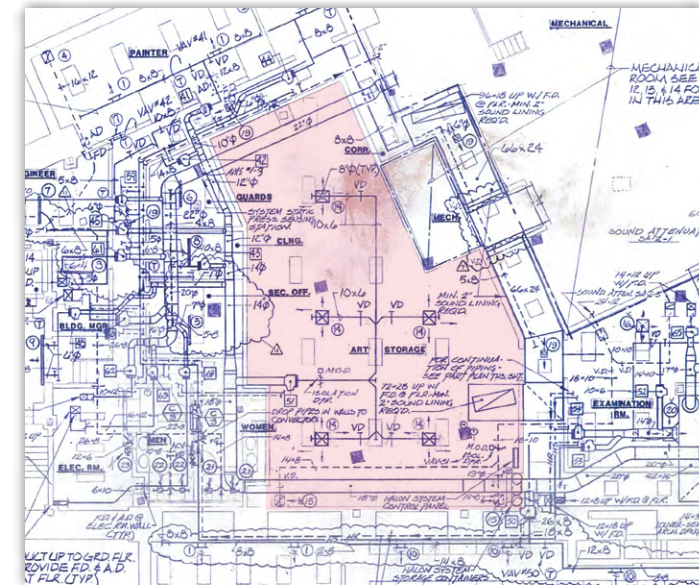
Mueller's team introduced linear, "toe kick" architectural openings for return air in reveals at the base of the gallery walls, which

eliminated disruptive grilles and preserved clean expanses of walls for showcasing art. Supply air is positioned at the top of the walls and directed away from the art. The strategic use of air distribution in the cavity between the exterior and interior walls allowed the team to maximize ceiling height.

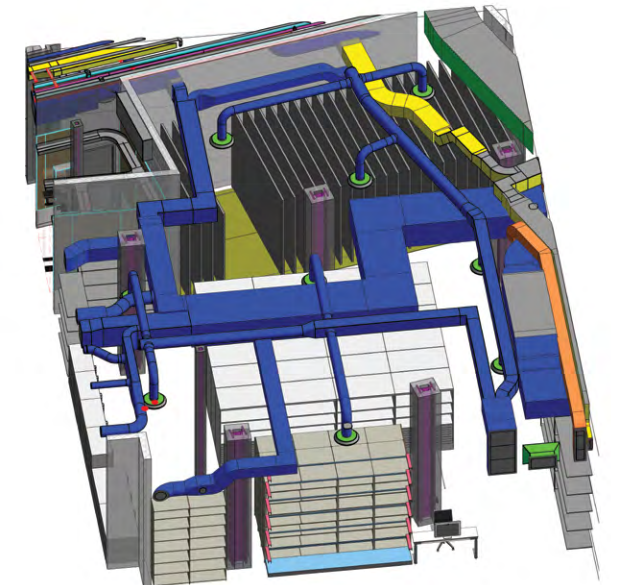
"The mechanical, electrical and plumbing (MEP) systems blend in with the surrounding architecture to minimize their visual and audible impact on the artwork," adds **Cara Versace, AIA, NCARB, LEED AP BD+C**, of MCA. "A great example of this seamless integration between the architecture and the MEP systems is the gallery walls themselves. The base of the gallery walls incorporates both a return air slot and a wiremold raceway hidden within a 2" tall reveal. The return air slot eliminates the need

for return air grilles on the wall surface, and the raceway provides greater flexibility for electronic displays. These two strategies helped provide a large continuous display surface for art without sacrificing functionality."

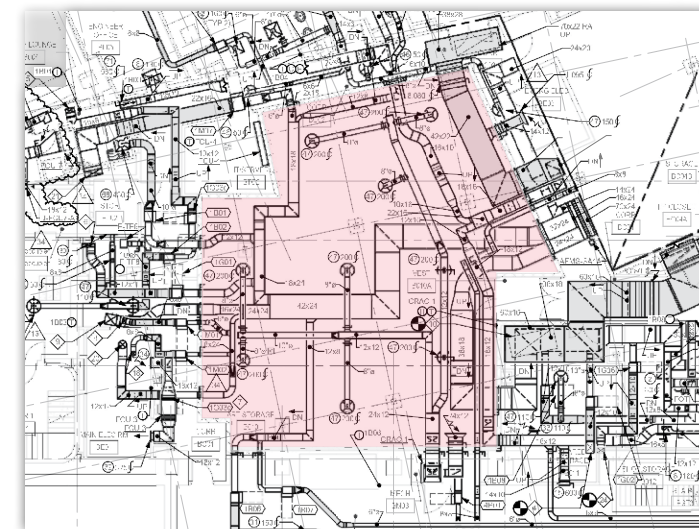
The new electrical design enhanced flexibility in the galleries as well. "The electrical design for the building presented several challenges," says **David von Behren, PE**, senior project electrical engineer with Mueller. "The renovation meets the requirements for obtaining LEED® Green Building certification, including automatic lighting controls. Innovations in the electrical design include a building-wide lighting control system, allowing exhibit lighting to be readily adjusted without requiring extensive system re-programming."



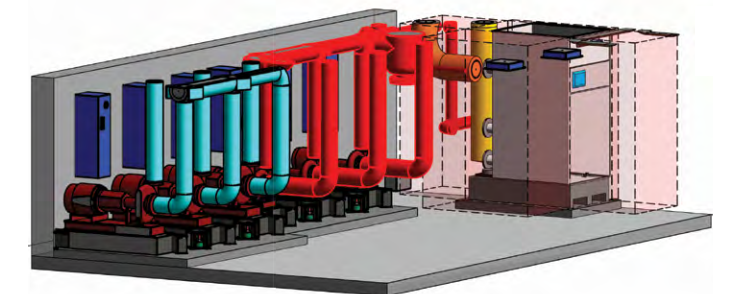
1985 Basement HVAC Floor Plan: Hand-drafted details of Mueller's original HVAC design for the basement floor plan, which housed art storage and mechanical and electrical equipment rooms.



2023 Art Storage 3D Revit: The new systems in the building were modeled in 3D in Revit to coordinate with other building elements, including in the reconfigured Art Storage room.



2023 Basement Ductwork Construction Plan: The 2023 construction document for the updated basement layout modeled in Revit shows the floor plan view of the new ductwork layout.



2023 Annex Mechanical Room: New mechanical and electrical equipment was also modeled in 3D in Revit to coordinate the mechanical and electrical spaces.



Photos by Kevin Allen

When it was closed during construction, NMWA continued to engage with the public through virtual programs and dramatic displays of graphic art along the building's exterior in downtown Washington, D.C. **Above left:** MISS CHELOVE, *Reseeded: A Forest Floor Flow* (installation view), 2022, printed mesh 60 x 48 feet. Commissioned by the National Museum of Women in the Arts with support provided by the DC Commission on the Arts and Humanities. © 2022 Miss Chelove. **Above right:** Katharina Cibulka, *SOLANGE #27* (installation view, National Museum of Women in the Arts, Washington, D.C.), 2022; Mesh scaffolding net, tulle, and cable ties, 82 x 82 feet. © 2022 Katharina Cibulka. **Below right:** Women have primarily led the design and construction of the recent NMWA renovation. Susan Fisher Sterling, the Alice West Director of NMWA, center, is photographed with the project's design and construction team.

"We undertook a comprehensive piping replacement project throughout the building, including the under-slab piping," says **Karen Schulte, PE, CPD, LEED-AP BD+C**, project manager, who led Mueller's plumbing engineering design. One of the most complex aspects of the project was coordinating across disciplines to ensure that piping didn't infringe upon the Art Storage and Institutional Archives rooms. "With significant portions of the basement designated as off-limits, navigating through limited pathways to access the vertical pathways within the building was challenging," Karen adds. "Coordination via Revit 3D proved indispensable in facilitating the design process under these constraints."

"The seamless integration of new MEP systems into the iconic building was critical to the project's success," says Cara Versace. "The MEP systems were designed to work in concert with the improvements made to the historic envelope to protect and preserve NMWA's remarkable collection."

Through thoughtful gallery reconfigurations, patrons are now guided on a journey through the museum, allowing for seamless navigation and heightened engagement with the artworks. "The journey for patrons begins in the Great Hall, which is an iconic, beloved space," Vicchio adds. "It continues through the galleries and even into the fourth-floor library and Learning Commons. Now, visitors can not only see the art; they can learn about it and even make their own art. Whether a visitor comes alone or with a group, there is now a much higher level of engagement. That enhanced experience is exactly what the museum had envisioned with this project."



Photo by Kevin Allen / courtesy of NMWA



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